

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today
(1) was not written for publication in a law journal and
(2) is not binding precedent of the Board.

Paper No. 16

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte YOSHIKAZU OHNO

Appeal No. 97-3917
Application 08/467,650¹

ON BRIEF

Before FLEMING, LEE and TORCZON, Administrative Patent Judges.
LEE, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from
the final rejection of claims 1-18. No claim has been
allowed.

References relied on by the Examiner

Anand et al. (Anand)	5,111,355	May 5, 1992
Koyama	5,486,713	Jan. 23, 1996

¹ Application for patent filed June 6, 1995.

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(filed May 26, 1995)

Torii et al. (Torii) Japanese Laid Open App. 3-256358
Nov. 15, 1991

Takahashi Japanese Laid Open App. 4-6865
Jan. 10, 1992

Appellant's stated prior art Figures 5-6.

The Rejections on Appeal

Claims 1-18 stand finally rejected under 35 U.S.C. § 103 as being unpatentable over the appellant's prior art Figures 5 and 6 in view of Takahashi, Torii, and Koyama.

Claims 1-18 further stand finally rejected under 35 U.S.C.

§ 103 as being unpatentable over the appellant's prior art Figures 5 and 6, in view of Takahashi, Torii, Koyama, and Anand.

With respect to Anand, the examiner states only the following (answer at 4):

Anand teaches the use of well-known materials for capacitance use which would have been obvious to a skilled artisan in combination with Prior Art Figures 5-6, Takahashi, Torii, and Koyama.

The Invention

The invention is directed to a semiconductor device

incorporating capacitors. A first capacitor electrode and a second capacitor electrode are formed to confront the first capacitor electrode through a dielectric film. The first capacitor electrode includes a first-layer electrode and a second-layer electrode. The second-layer electrode is formed of a material having a barrier property and has a circumferential side surface located inner than the side surface of the first-layer electrode. The dielectric film contacts the upper and side surface of the first layer electrode and is "spaced out" from the side surface of the second layer electrode.

Representative independent claim 1 is reproduced below:

1. A semiconductor device incorporating capacitors comprising:

a first capacitor electrode;

a capacitor dielectric film; and

a second capacitor electrode formed to confront said first capacitor electrode with said capacitor dielectric film interposed therebetween,

said first capacitor electrode including a first-layer electrode which has an upper and lower surfaces and a circumferential side surface, and a second-layer electrode which is formed by being in contact electrically with said first-layer electrode at the lower surface thereof and has a circumferential side surface located inner than the side surface of said first-layer electrode, said second-layer

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electrode being formed of a material having a barrier property,

said capacitor dielectric film being in contact with the upper surface and side surface of said first-layer electrode and being spaced out from the side surface of said second-layer electrode.

Opinion

Our opinion is based solely on the arguments raised by the appellant in his briefs. We do not address and offer no opinion on arguments which could have been raised but were not set forth in the briefs.

We sustain the rejection of claims 1-18 over prior art.

The appellant has grouped all claims 1-18 together for single treatment (Br. at 5). We will discuss claim 1.

As noted above, Anand was relied on by the examiner only to show specific materials well known for forming the capacitor. Claim 1 does not require any specific material. Therefore, we will discuss the rejection based on the admitted prior art, Takahashi, Torii and Koyama. The discussion would be equally applicable to the rejection based on the admitted prior art, Takahashi, Torii, Koyama and Anand.

The distinction of the claimed invention over the admitted prior art of Figures 5 and 6 is that the second-layer

electrode of the first capacitor electrode has a more inner circumference than the first-layer electrode of the first capacitor electrode and that the dielectric film is "spaced out" from the side surface of the second-layer electrode. To account for this distinction, the examiner relied on Takahashi.

Takahashi does disclose a capacitor having a first capacitor electrode including a first-layer electrode and a second-layer electrode. Also, Takahashi's second-layer electrode does have a more inner circumferential side surface than the side surface of the first-layer electrode. However, with respect to the claim requirement that the dielectric film is "spaced out" from the side surface of the second-layer electrode, the examiner's reliance on Takahashi is without support and misplaced.

In the final Office action on page 4 (Paper No. 7), the examiner states that in Takahashi the dielectric layer 38 "confronts upper side and lower surfaces of the electrode 'by being space out therefrom.'" It is unclear just what the examiner is referring to by "the electrode." To the extent the examiner is finding that the dielectric layer 38 is

"spaced out" from the second-layer electrode 33 by virtue of being positioned in an abutting relationship as is seen in Figure 1(f), we disagree.

In the context of the appellant's claimed invention and disclosure, "spaced out" from a side surface means separated from and not contiguous with the side surface of the electrode. Indeed, as is explained in the specification on page 5, it is contact between the dielectric film and the side surface of the lower layer electrode which causes a leakage current problem.

It is unreasonable to regard Takahashi's dielectric layer 38 as being "spaced out" from the lower or second-layer electrode 33.

Alternatively, the examiner's answer sets forth another view. On page 5 of the answer, it is stated "Takahashi's layer 38 provides the 'spaced out' function between electrode 37 and dielectric 39.'" However, the position is misplaced and without merit. In Takahashi, layer 38 is itself the dielectric layer, not a spacer. Also, as is correctly argued by the appellant (Reply at 4) layer 39/39a is the other electrode of the capacitor, not the dielectric film.

Further on page 5 of the answer, the examiner indicates that the rejection is not based solely on Takahashi to meet the "spaced out" claim requirement. The examiner states "multiple layer dielectrics are well-known in the semiconductor industry," citing Torii. More specifically, in the answer on page 4, the examiner relied on Torii and Koyama as teaching "the use of multiple insulators." The same statement was made in the final Office action (Paper No. 7) on page 3. However, we do not read Torii and Koyama as containing disclosure which can make up for the deficiencies of Takahashi as already discussed above.

That it was generally known that a single insulator layer may be replaced by multiple segments of plural insulators does not provide reasonable motivation for one with ordinary skill in the art to "space out" a capacitor's dielectric film from the lower or second-layer electrode of a first capacitor electrode. In Torii, the examiner relied (answer at 5) on multiple insulator segments around the bit line 8 as teaching the use of multiple insulators where one insulator layer would be enough. The appellant correctly pointed out that this feature regarding the isolation of a bit line would not have

reasonably suggested the claimed relationship between a capacitor's dielectric film and the first-layer and second-layer electrodes of a capacitor electrode. The claimed invention is more than using multiple insulator layers in place of a single insulator layer as an insulator. Torii's capacitor, i.e., elements 13-15, do not reflect the claimed features concerning the dielectric film. As for Koyama, the examiner states nothing more than that it is relied on to show the use of multiple insulators. That, of course, is not sufficient to meet the claim.

As is the case with Torii, Koyama discloses and reasonably suggests no dielectric layer contacting the upper and side surfaces of the first-layer electrode 9, which is also "spaced out" from the side surface of the second-layer electrode 8. Note also that in Koyama, the second-layer electrode has a circumferential side surface located outer than the side surface of the first-layer electrode, not inner as the appellant claims.

The examiner has, however, taken one position which is proper and sufficient to support the rejection of claim 1. On page 5 of the answer in lines 21-24, the examiner stated:

Furthermore, even the Prior Art Figures 5 - 6 teach a first portion of electrode 11 and a second portion 12 wherein dielectric 13 is "spaced out" from small circumference electrode 11 by insulator 9.

The examiner's position is reasonable. As is seen in appellant's Figure 6, the plug 11 forms a lower or second-layer electrode and layer 12 forms an upper or first-layer electrode. The dielectric film 13 contacts the upper and side surfaces of the upper or first-layer electrode and is spaced out from the lower or second-layer electrode 11 by insulator 9.

The appellant attempts to rebut the examiner's position by stating that claim 1 recites: "a second capacitor electrode formed to confront said first capacitor electrode with said capacitor dielectric film interposed therebetween." According to the appellant, the above-quoted limitation would require the lower or second-layer electrode of the first capacitor electrode to be confronting the second capacitor electrode with a dielectric film in between. We disagree.

The first capacitor electrode still confronts the second capacitor electrode even if only its first-layer electrode and not its second-layer electrode is confronting the second

capacitor electrode through the dielectric film. Not all of the first capacitor electrode's constituent electrode layers have to be confronting the second capacitor electrode in order to say that the first capacitor electrode confronts the second capacitor electrode. Nothing requires reading into claim 1 this "all layers must confront" aspect of the appellant's disclosed preferred embodiment to make sense of the claim. Thus, the feature is extraneous to the claimed invention and should not be read into the claims. In re Prater, 415 F.2d 1393, 1404, 162 USPQ 541, 550 (CCPA 1969). During patent examination, claim terms are properly given their broadest reasonable interpretation consistent with the specification. In re Zletz, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989); In re Yamamoto, 740 F.2d 1569, 1571, 222 USPQ 934, 936 (Fed. Cir. 1984).

Note further that in an amendment filed February 5, 1997 (Paper No. 8), the appellant deleted this language from claim 1 concerning the dielectric film: "being formed to confront the side surface of said second-layer electrode". Thus, it is not necessary that the second-layer electrode be confronted by

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the dielectric film. That lends further support to our view that the second-layer electrode need not confront the second capacitor electrode through the dielectric film interposed therebetween.

Conclusion

The rejection of claims 1-18 under 35 U.S.C. § 103 as being unpatentable over the appellant's admitted prior art, Takahashi, Torii, and Koyama is affirmed.

The rejection of claims 1-18 under 35 U.S.C. § 103 as being unpatentable over the appellant's admitted prior art, Takahashi, Torii, Koyama, and Anand is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

Michael R. Fleming)
Administrative Patent Judge)
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) BOARD OF PATENT

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